

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
HELMET ASSEMBLY, ITEM 105 ----- A/L 9672-03 (1)	2/1R	105FM02 Loss of attachment, vent pad. Defective Material; Bond.	END ITEM: Vent pad detached from back of helmet. GFE INTERFACE: Degraded O2 stream direction; vent flow bypasses crewman's face area. CO2 build-up and Helmet fogging. MISSION: Terminate EVA. CREW/VEHICLE: None with single failure. Loss of crewman if CPV/SOP fail. TIME TO EFFECT /ACTIONS: Minutes. TIME AVAILABLE: Minutes. TIME REQUIRED: Seconds. REDUNDANCY SCREENS: A-PASS B-PASS C-PASS	A. Design - The vent pad is permanently bonded to the polycarbonate helmet shell using a 2 part flexible polyurethane adhesive, PR-1535. In use the vent pad is loaded only by airflow through the helmet vent and there are no man loads acting to separate the pad bond. The vent pad is only accessible from inside of the helmet, making it unlikely to be damaged during handling. B. Test - Acceptance: Component - See Inspection. PDA: The following tests are conducted on the Helmet Assembly level in accordance with ILC Document 0111-70028J. Proof pressure test at 8.0 (+0.2 - 0.0) psig for five minutes to verify no structural damage. Certification: An Apollo helmet was successfully tested (manned) during SSA certification to duplicate operational life. (Ref. ILC Engineering Memorandum 83-1083). The helmet assembly successfully passed the shock, vibration and acceleration requirements for the EMU (ref. HS TER'S 3067, 3068, 3043, and 3076). The helmet was successfully subjected to an ultimate pressure of 10.6 psig during SSA certification Ref. ILC Document 0111-70027. This is two times normal maximum operating pressure based on 5.3 psi. Recertification to 5.5 was by test and analysis (Ref. ILC EM 84-1108). Helmet was successfully tested to verify its acceptability for 8.0 psi use (ref. NASA Report CSD-SH-240). Testing included 50 pressure cycles and 1400 hours pressurized time @ 8.8 psig and 520 pressure cycles at 13.2 psig. Tests also included a burst pressure check at 23.8 + .2 psig followed by a leakage check which disclosed no leaks. Maximum shuttle operating pressure is 5.5 psi. C. Inspection - Components and material manufactured to ILC requirements at an Approved Supplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the materials received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provides traceability information. D. Failure History - B-EMU-105-A001 (7-9-88) Helmet vent pad debonded from neck ring. Per ECO 891-0089, a design change to taper foam to match helmet contour and manufacturing change requiring priming of neck ring surface before bonding allows for greater adhesion to bubble. E. Ground Turnaround - Inspected for non-EET processing per FEMU-R-001, Pre-Flight External visual inspection. None for EET processing. Every four years the helmet is demated from the EVVA and CPV, and is visually inspected for material degradation or damage (particularly at CPV and EVVA interface attachment areas).

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F. Operational Use -
Crew Response -
Pre-EVA : If detected, troubleshoot problems.
EVA : If detected, assess suit CO2 level. If symptoms noted, terminate EVA with helmet purge valve open. If no symptoms noted, continue EVA, periodically evaluate for CO2 symptoms.
Special Training -
Standard training covers this failure mode.
EV Crew trained to recognize the symptoms of high CO2.
Operational Considerations -
EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules define go/no-go criteria related to ventilation flow and CO2 control.

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-105 HELMET ASSEMBLY
CRITICAL ITEM LIST (CIL)
EMU CONTRACT NO. NAS 9-97150

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